*FIGURE 5*

MALARIA PREVALENCE SURVEY IN AFGHANISTAN
OCT/NOV 1999

*Age adjusted distribution of all malaria cases*

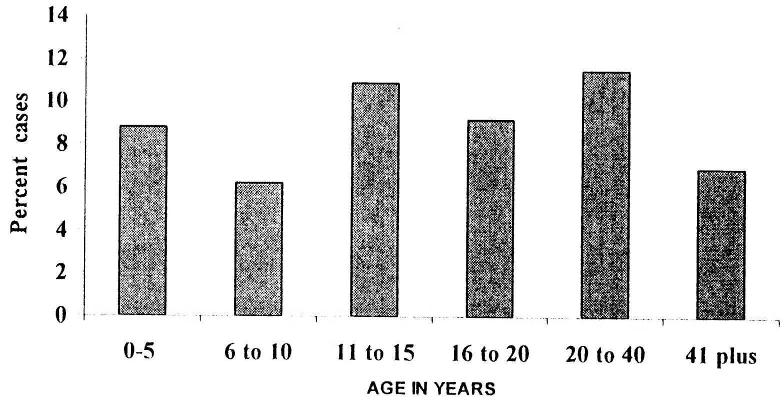



*FIGURE 6*

MALARIA PREVALENCE SURVEY IN AFGHANISTAN
OCT/NOV 1999

*Age distribution of PF and PV cases*

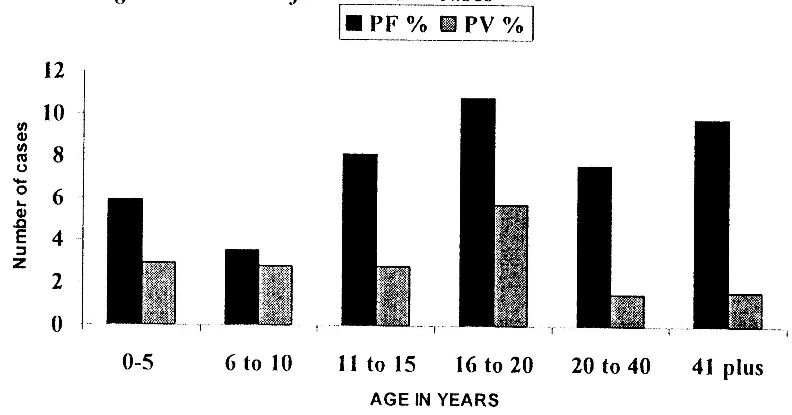


*FIGURE 7*

**MALARIA PREVALENCE SURVEY IN AFGHANISTAN OCT/NOV 1999**

*Age and gender distribution of malaria cases*

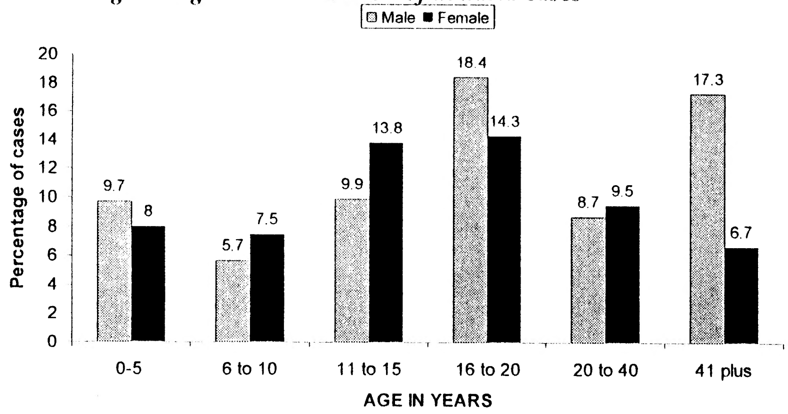



**FIGURE 8**

**MALARIA PREVALENCE SURVEY IN AFGHANISTAN OCT/NOV 1999**

*Percentage of bed net users by province*

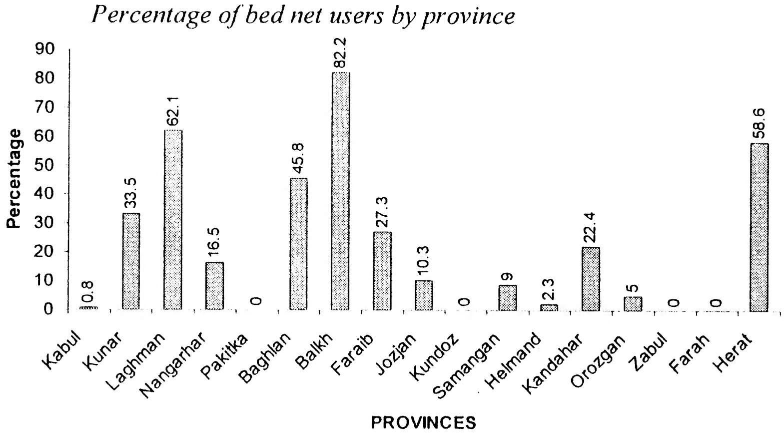


*FIGURE 9*

**MALARIA PREVALENCE SURVEY IN AFGHANISTAN OCT/NOV 1999**

*Malaria cases and bed nets use*

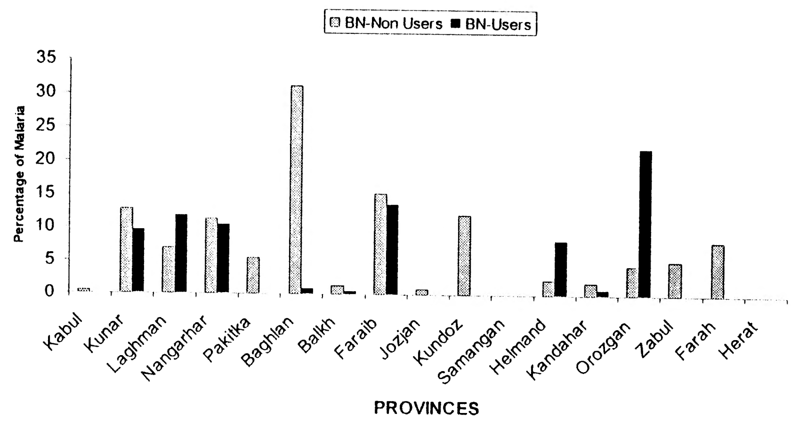



*FIGURE 10*

**MALARIA PREVALENCE SURVEY IN AFGHANISTAN OCT/NOV 1999**

Scatter plot showing the prevalence of falciparum malaria in relation to those claiming to be using bed nets

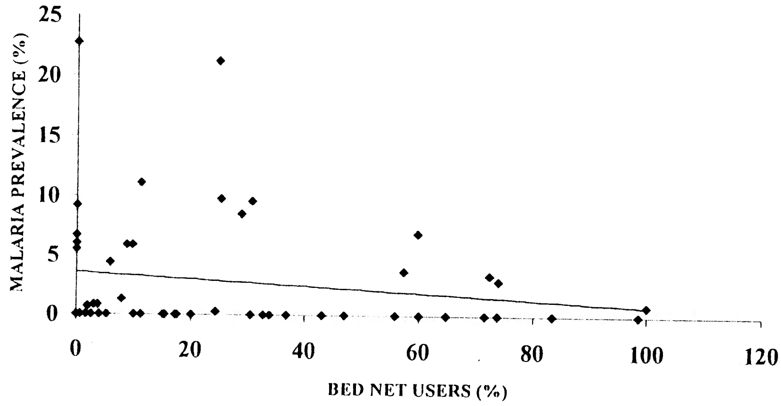


*FIGURE 11*

**MALARIA PREVALENCE SURVEY IN AFGHANISTAN OCT/NOV 1999**

Scatter plot showing the prevalence of vivax malaria in relation to those claiming to be using bed nets

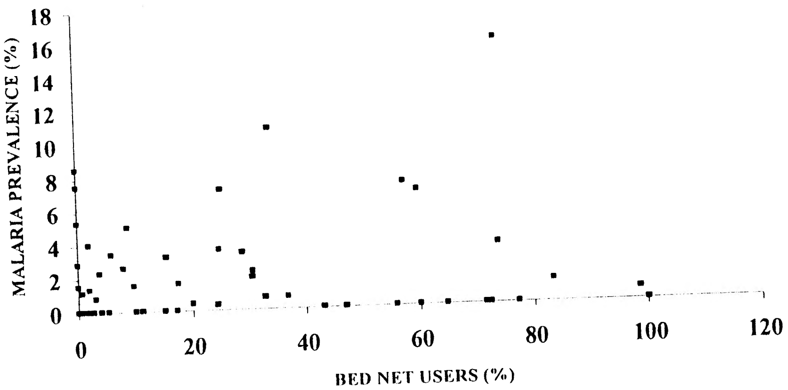



*FIGURE 12*

**MALARIA PREVALENCE SURVEY IN AFGHANISTAN OCT/NOV 1999**

*Malaria among bed net users versus nonusers*

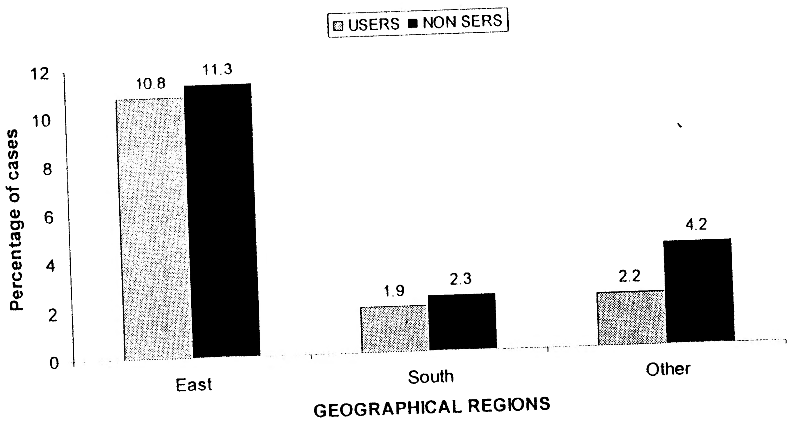
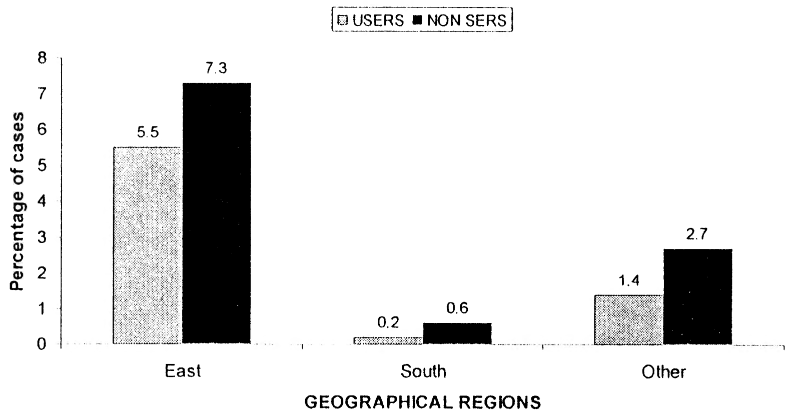


*FIGURE 13*

**MALARIA PREVALENCE SURVEY IN AFGHANISTAN OCT/NOV 1999**

*P.falciparum among bed net users versus nonusers*



## *Appendix 1*

# RESULTS OF MALARIA PREVALENCE SURVEY OCT/NOV 1999

| Province | District | Village | TSE | PF | M | PV | Malaria | % PF | % PV | % Malaria |
|---|---|---|---|---|---|---|---|---|---|---|
| Badghis | Murghab | Takht Bazar | 109 | | | | 0 | 0.0 | 0.0 | 0.0 |
| **Badghis Total** | | | **109** | | | | **0** | **0.0** | **0.0** | **0.0** |
| Baghlan | Doshi | Bagh Mula Shah | 119 | 1 | | | 1 | 0.8 | 0.0 | 0.8 |
| | Pul Khumri | 600 Koti | 141 | 32 | | 12 | 44 | 22.7 | 8.5 | 31.2 |
| **Baghlan Total** | | | **260** | **33** | | **12** | **45** | **12.7** | **4.6** | **17.3** |
| Balkh | Balkh | Sikander | 150 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Chamtal | Now shar Alizai | 151 | | | 2 | 2 | 0.0 | 1.3 | 1.3 |
| | Sholgar | Qadim School | 148 | | | 1 | 1 | 0.0 | 0.7 | 0.7 |
| **Balkh Total** | | | **449** | | | **3** | **3** | **0.0** | **0.7** | **0.7** |
| Farah | Dizak | Markaz | 194 | 13 | | 3 | 16 | 6.7 | 1.5 | 8.2 |
| **Farah Total** | | | **194** | **13** | | **3** | **16** | **6.7** | **1.5** | **8.2** |
| Fariab | Khwaja Mosah | City | 137 | 29 | | 5 | 34 | 21.2 | 3.6 | 24.8 |
| | Markaz Fariab | City | 105 | | | 2 | 2 | 0.0 | 1.9 | 1.9 |
| **Fariab Total** | | | **242** | **29** | | **7** | **36** | **12.0** | **2.9** | **14.9** |
| Helmand | Garmsir | Markaz | 132 | 1 | | 3 | 4 | 0.8 | 2.3 | 3.0 |
| | Greshk | Markaz | 150 | 1 | | 6 | 7 | 0.7 | 4.0 | 4.7 |
| | Lashkargah | Markaz | 132 | 1 | | 1 | 2 | 0.8 | 0.8 | 1.5 |
| | Nadeali | Mula Ghulam | 116 | | | | 0 | 0.0 | 0.0 | 0.0 |
| **Helmand Total** | | | **530** | **3** | | **10** | **13** | **0.6** | **1.9** | **2.5** |
| Herat | Ghoryan | Lesa Alekozai | 143 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Zindajan | Maktab Foshnj | 130 | | | | 0 | 0.0 | 0.0 | 0.0 |
| **Herat Total** | | | **273** | | | | **0** | **0.0** | **0.0** | **0.0** |
| Jozjan | Aqcha | Aqcha | 111 | 3 | | 3 | 6 | 2.7 | 2.7 | 5.4 |
| | Shebrqan | City | 150 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Warzab | Haji Asmahil | 121 | | | | 0 | 0.0 | 0.0 | 0.0 |
| **Jozjan Total** | | | **382** | **3** | | **3** | **6** | **0.8** | **0.8** | **1.6** |
| Kabul | Bagrami | Ahemad Khan | 150 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Kamari | 116 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | De Sabz | Maktab Abdul Ghafoor Ahemadi | 150 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Dist.10 | 1 Wazirabad | 152 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Charqalah Wazirabad | 150 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Dist.11 | Khair Khana2 | 150 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Dist.9 | Macroyan | 151 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Qalah Zaman Khan | 150 | | | 5 | 5 | 0.0 | 3.3 | 3.3 |
| | | Shash Darak | 146 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Khair Khana | 500 Family | 152 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Surobi | Bada Khail | 77 | 1 | | 2 | 3 | 1.3 | 2.6 | 3.9 |
| | | Madresa | 108 | 7 | | 5 | 12 | 6.5 | 4.6 | 11.1 |
| **Kabul Total** | | | **1652** | **8** | | **12** | **20** | **0.5** | **0.7** | **1.2** |
| Kandahar | Arghandab | Jilahore | 50 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Joundo Hadira | 40 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Loytabien | 60 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Arghistan | Markaz | 151 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | City | Nahia-2 | 151 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Nahia-5 | 147 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Nahia-6 | 150 | | | 2 | 2 | 0.0 | 1.3 | 1.3 |
| | Daman | Ghra Kali | 151 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Khoshab | 152 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Dand | Rawani | 150 | | | 1 | 1 | 0.0 | 0.7 | 0.7 |
| | Khak Rez | Khoshikili | 150 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Khakriz | Char Sang K | 75 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Char Sang L | 75 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Maruf | Pir zai | 50 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Shir Ghazo Kali | 100 | | | 1 | 1 | 0.0 | 1.0 | 1.0 |
| | Maywand | Azam jan Karez | 142 | | | 4 | 4 | 0.0 | 2.8 | 2.8 |
| | | Khogyani | 138 | | | 2 | 2 | 0.0 | 1.4 | 1.4 |
| | | Markaz | 153 | | 1 | 8 | 9 | 0.0 | 5.2 | 5.9 |
| | Panjwaie | Agha Lalai | 37 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Bazar | 40 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Mula Shir Akhond | 75 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Tolokan | 149 | 1 | | 1 | 2 | 0.7 | 0.7 | 1.3 |
| | Shawalikot | Alizai | 17 | | | | 0 | 0.0 | 0.0 | 0.0 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Khadarzai | 39 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Markaz | 76 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Shiga | Abdullah zai | 104 | 3 | | 1 | 4 | 2.9 | 1.0 | 3.8 |
| | | Haji Shir Aka | 96 | 7 | | 2 | 9 | 7.3 | 2.1 | 9.4 |
| | | Hassanzai | 75 | 4 | | 6 | 10 | 5.3 | 8.0 | 13.3 |
| | | Salman zai | 46 | | | 2 | 2 | 0.0 | 4.3 | 4.3 |
| **Kandahar Total** | | | **2839** | **15** | **1** | **30** | **46** | **0.5** | **1.1** | **1.6** |
| Khost | Ali Sher | Zardran | 110 | | | 2 | 2 | 0.0 | 1.8 | 1.8 |
| | Baak | Nammi | 122 | 11 | | 3 | 14 | 9.0 | 2.5 | 11.5 |
| | Jaji Maidan | Soaki | 104 | 23 | | 1 | 24 | 22.1 | 1.0 | 23.1 |
| | Markaz | Noorzai Maktab | 117 | 8 | | 4 | 12 | 6.8 | 3.4 | 10.3 |
| | Nadarshah Kot | Nadirshah Kot School | 116 | 2 | | 1 | 3 | 1.7 | 0.9 | 2.6 |
| | Tanni | Noorkhail | 137 | 1 | | 6 | 7 | 0.7 | 4.4 | 5.1 |
| **Khost Total** | | | **706** | **45** | | **17** | **62** | **6.4** | **2.4** | **8.8** |
| Kunar | Bar Kandi | Bar Kandi | 86 | | | 1 | 1 | 0.0 | 1.2 | 1.2 |
| | | Bar Kandi School | 63 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Markaz | Sheesha | 119 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Narhing | Baila | 25 | 10 | 1 | 1 | 12 | 40.0 | 4.0 | 48.0 |
| | | Bar Narang | 29 | 3 | | | 3 | 10.3 | 0.0 | 10.3 |
| | | Bara Narhing | 25 | 4 | | 2 | 6 | 16.0 | 8.0 | 24.0 |
| | | Bela | 25 | 5 | | 1 | 6 | 20.0 | 4.0 | 24.0 |
| | | Char Qalah | 119 | 44 | | 1 | 45 | 37.0 | 0.8 | 37.8 |
| | | Ghondo | 50 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Kabra Jar | 28 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Kado Khail | 29 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Karajar | 17 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Karvanda | 24 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Keronda | 26 | 2 | | | 2 | 7.7 | 0.0 | 7.7 |
| | | Khairabad | 116 | 47 | 1 | 1 | 49 | 40.5 | 0.9 | 42.2 |
| | | Kodo Kale | 24 | 4 | | 1 | 5 | 16.7 | 4.2 | 20.8 |
| | | Kooz Ghonda | 25 | 4 | | | 4 | 16.0 | 0.0 | 16.0 |
| | | Kooz Narhing | 50 | 7 | | 4 | 11 | 14.0 | 8.0 | 22.0 |
| | | Kooz Narhing Brkli | 25 | 6 | | 2 | 8 | 24.0 | 8.0 | 32.0 |
| | | Kra Mahr | 25 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Lematek | 29 | 1 | | | 1 | 3.4 | 0.0 | 3.4 |
| | | Sharalo Kale | 25 | 1 | | | 1 | 4.0 | 0.0 | 4.0 |
| | | Sharalo kali | 1 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Sherla | 25 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Noor Gul | Bar Noor Gul | 81 | 4 | | 1 | 5 | 4.9 | 1.2 | 6.2 |
| | | Jaba | 31 | 4 | | 2 | 6 | 12.9 | 6.5 | 19.4 |
| | | Katar Kale | 50 | | | 1 | 1 | 0.0 | 2.0 | 2.0 |
| | | Kooz Kunar | 25 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Koz Noor Gul | 25 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Ladoora | 24 | | | 1 | 1 | 0.0 | 4.2 | 4.2 |
| | | Marwora | 25 | 1 | | 2 | 3 | 4.0 | 8.0 | 12.0 |
| | | Mia Qalah | 52 | 2 | | 1 | 3 | 3.8 | 1.9 | 5.8 |
| | | Pasten Kela | 25 | 2 | | | 2 | 8.0 | 0.0 | 8.0 |
| | | Patan | 25 | | | 2 | 2 | 0.0 | 8.0 | 8.0 |
| | | Sangerzi | 20 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Sehri | 25 | 1 | | 2 | 3 | 4.0 | 8.0 | 12.0 |
| | | Send Gara | 25 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Singhara | 24 | 4 | | 2 | 6 | 16.7 | 8.3 | 25.0 |
| | | Teari | 26 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Qamchi | Qamchi | 120 | 9 | | 9 | 18 | 7.5 | 7.5 | 15.0 |
| | Sheigal | Monni | 70 | 1 | | | 1 | 1.4 | 0.0 | 1.4 |
| | | Sheigal | 102 | | | 3 | 3 | 0.0 | 2.9 | 2.9 |
| | Soki | Baber | 25 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Baboro Kale | 25 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Garigal | 25 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Grigal | 25 | | | 1 | 1 | 0.0 | 4.0 | 4.0 |
| | | Kalmani | 49 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Kandahar Kale | 25 | 7 | | 2 | 9 | 28.0 | 8.0 | 36.0 |
| | | Khoaki Kahe | 28 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Maqsood Kale | 28 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Mshood Kale | 25 | 1 | | 1 | 2 | 4.0 | 4.0 | 8.0 |
| | | Qari Khail | 50 | 4 | | | 4 | 8.0 | 0.0 | 8.0 |
| | | Qazi Patek | 25 | 1 | | 1 | 2 | 4.0 | 4.0 | 8.0 |
| | | Rogi | 50 | | | 1 | 1 | 0.0 | 2.0 | 2.0 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Sagkoli | 25 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Sankoli | 25 | 1 | | 1 | 2 | 4.0 | 4.0 | 8.0 |
| | | Sokai | 25 | 4 | | | 4 | 16.0 | 0.0 | 16.0 |
| | | Sokai Kela | 23 | 8 | | | 8 | 34.8 | 0.0 | 34.8 |
| | | SOKAI QALI | 25 | 3 | | | 3 | 12.0 | 0.0 | 12.0 |
| | Wata Poor | Buddam | 88 | 1 | | 4 | 5 | 1.1 | 4.5 | 5.7 |
| | | Daag Karmol | 106 | | | 4 | 4 | 0.0 | 3.8 | 3.8 |
| | | Sematan | 72 | 5 | | 5 | 10 | 6.9 | 6.9 | 13.9 |
| | | Shegam | 103 | 16 | | 3 | 19 | 15.5 | 2.9 | 18.4 |
| | | Wata Pur | 119 | 5 | | 2 | 7 | 4.2 | 1.7 | 5.9 |
| **Kunar Total** | | | **2776** | **222** | **2** | **65** | **289** | **8.0** | **2.3** | **10.4** |
| Kundoz | Khanabad | Kabuli Qeshlaq | 141 | 13 | | 4 | 17 | 9.2 | 2.8 | 12.1 |
| | Kundoz | Kala Gaho | 147 | 1 | | 2 | 3 | 0.7 | 1.4 | 2.0 |
| **Kundoz Total** | | | **288** | **14** | | **6** | **20** | **4.9** | **2.1** | **6.9** |
| Laghman | Alishang | Islamabad | 91 | | | 2 | 2 | 0.0 | 2.2 | 2.2 |
| | | Maktab Islamabad | 80 | | | 4 | 4 | 0.0 | 5.0 | 5.0 |
| | Karighani | Sana Mangal | 69 | 2 | | 11 | 13 | 2.9 | 15.9 | 18.8 |
| | Laghman | Shah Mangal | 75 | | | 8 | 8 | 0.0 | 10.7 | 10.7 |
| | Qarqahi | Qazi Keli | 7 | 1 | | 1 | 2 | 14.3 | 14.3 | 28.6 |
| | | Tara Khail | 102 | 5 | | 13 | 18 | 4.9 | 12.7 | 17.6 |
| | Qarshi | Shamshare Abad | 108 | 4 | | 8 | 12 | 3.7 | 7.4 | 11.1 |
| **Laghman Total** | | | **532** | **12** | | **47** | **59** | **2.3** | **8.8** | **11.1** |
| Logar | Pul Alam | Pork | 100 | | | 4 | 4 | 0.0 | 4.0 | 4.0 |
| **Logar Total** | | | **100** | | | **4** | **4** | **0.0** | **4.0** | **4.0** |
| Nangarhar | Achin | Mamnd Morgi | 136 | 5 | | 1 | 6 | 3.7 | 0.7 | 4.4 |
| | | Mohmand School | 100 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Sandoq | 101 | 9 | | 3 | 12 | 8.9 | 3.0 | 11.9 |
| | | Shadi | 85 | 7 | | 1 | 8 | 8.2 | 1.2 | 9.4 |
| | Ahasarak | Gat Khail | 50 | 4 | | 1 | 5 | 8.0 | 2.0 | 10.0 |
| | | Mohd Qlaha | 50 | 4 | 1 | 3 | 8 | 8.0 | 6.0 | 16.0 |
| | | Navar | 59 | 2 | | 3 | 5 | 3.4 | 5.1 | 8.5 |
| | | Sonzahi | 55 | 11 | | 3 | 14 | 20.0 | 5.5 | 25.5 |
| | | Tiao Kale | 59 | 3 | | 3 | 6 | 5.1 | 5.1 | 10.2 |
| | Angoor Bagh | Angoor Bagh | 145 | | | 11 | 11 | 0.0 | 7.6 | 7.6 |
| | Angoor Bagh Total | | 145 | | | 11 | 11 | 0.0 | 7.6 | 7.6 |
| | Batikot | Krabao | 129 | 2 | | 12 | 14 | 1.6 | 9.3 | 10.9 |
| | Behsood | Behsood Khas | 142 | 2 | | 1 | 3 | 1.4 | 0.7 | 2.1 |
| | | Camp Tegab | 158 | 55 | 1 | 18 | 74 | 34.8 | 11.4 | 46.8 |
| | | Dobila | 146 | 5 | | 5 | 10 | 3.4 | 3.4 | 6.8 |
| | | Joyi10 | 38 | | | 5 | 5 | 0.0 | 13.2 | 13.2 |
| | | joyi11 | 115 | 3 | | 15 | 18 | 2.6 | 13.0 | 15.7 |
| | | Tamirat | 110 | 2 | | 15 | 17 | 1.8 | 13.6 | 15.5 |
| | | Vilaiati | 169 | 7 | | 13 | 20 | 4.1 | 7.7 | 11.8 |
| | Chaperhar | Mano | 84 | 1 | | 1 | 2 | 1.2 | 1.2 | 2.4 |
| | | Shkeryan | 101 | | | 2 | 2 | 0.0 | 2.0 | 2.0 |
| | Dur Baba | Madrasa Dur Baba | 72 | 1 | | | 1 | 1.4 | 0.0 | 1.4 |
| | Ghani Khail | Daga | 128 | 10 | 1 | 10 | 21 | 7.8 | 7.8 | 16.4 |
| | | joyi25 | 95 | 10 | | 9 | 19 | 10.5 | 9.5 | 20.0 |
| | Joiy7 | Maktab Joiy7 | 129 | 1 | | 20 | 21 | 0.8 | 15.5 | 16.3 |
| | Kama | Laisa Murad Ali | 121 | | | 8 | 8 | 0.0 | 6.6 | 6.6 |
| | | Qalah Akhond | 85 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Lahl Poor | Sherabad | 98 | 1 | | | 1 | 1.0 | 0.0 | 1.0 |
| | Mohmand Dara | Madresa Zaid bin Haris | 128 | 26 | | 9 | 35 | 20.3 | 7.0 | 27.3 |
| | Narhing | Lematek | 26 | 1 | | 1 | 2 | 3.8 | 3.8 | 7.7 |
| | Naring Bagh | Naring BAgh | 100 | 11 | | 13 | 24 | 11.0 | 13.0 | 24.0 |
| | Nazyan | Aliko | 195 | 9 | | | 9 | 4.6 | 0.0 | 4.6 |
| | | Bada Khail | 97 | 3 | | 1 | 4 | 3.1 | 1.0 | 4.1 |
| | | Baro Khola | 81 | 8 | | | 8 | 9.9 | 0.0 | 9.9 |
| | | Doa Khola Nazyan Madrasa | 55 | 1 | | 6 | 7 | 1.8 | 10.9 | 12.7 |
| | | Doa Nazyana Khola | 211 | 47 | 2 | 22 | 71 | 22.3 | 10.4 | 33.6 |
| | | Lal Mehndi | 108 | 7 | | 1 | 8 | 6.5 | 0.9 | 7.4 |
| | | lalmi | 83 | 10 | | | 10 | 12.0 | 0.0 | 12.0 |
| | | Mailivi Khola | 96 | 4 | | 3 | 7 | 4.2 | 3.1 | 7.3 |
| | | Mailo Khola | 101 | 7 | | | 7 | 6.9 | 0.0 | 6.9 |
| | | Nakhta Nao | 79 | 1 | | | 1 | 1.3 | 0.0 | 1.3 |
| | | Nakhtar Nao | 95 | 1 | | | 1 | 1.1 | 0.0 | 1.1 |
| | | Nazyan | 71 | 3 | | | 3 | 4.2 | 0.0 | 4.2 |
| | | Safra | 40 | | | | 0 | 0.0 | 0.0 | 0.0 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Sepra | 84 | 8 | | 6 | 14 | 9.5 | 7.1 | 16.7 |
| | | Sher Ali Khola | 65 | 5 | | 3 | 8 | 7.7 | 4.6 | 12.3 |
| | | Sheri | 65 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | | Sra Khoa | 75 | 6 | | 6 | 12 | 8.0 | 8.0 | 16.0 |
| | | Suobi | 60 | 1 | | | 1 | 1.7 | 0.0 | 1.7 |
| | Sorkh Road | Balabagh | 118 | 2 | | 2 | 4 | 1.7 | 1.7 | 3.4 |
| | | Char Bagh | 113 | 4 | | 12 | 16 | 3.5 | 10.6 | 14.2 |
| | | Sultan Poor Ali | 95 | | | | 0 | 0.0 | 0.0 | 0.0 |
| **Nangarhar Total** | | | **5001** | **310** | **5** | **248** | **563** | **6.2** | **5.0** | **11.3** |
| Orozgan | Dehrawod | Markaz | 150 | 1 | | 2 | 3 | 0.7 | 1.3 | 2.0 |
| | Shahristan | Chahr Aspan | 71 | 6 | | 6 | 12 | 8.5 | 8.5 | 16.9 |
| | | Mehr | 98 | 1 | | 1 | 2 | 1.0 | 1.0 | 2.0 |
| | | Zojoke | 72 | 7 | | 5 | 12 | 9.7 | 6.9 | 16.7 |
| | Tarinkot | Markaz | 148 | | | | 0 | 0.0 | 0.0 | 0.0 |
| Orozgan Total | | | 539 | 15 | | 14 | 29 | 2.8 | 2.6 | 5.4 |
| Paktia | Markaz | Bahlah Deh | 83 | 1 | | | 1 | 1.2 | 0.0 | 1.2 |
| | | Khajakhel | 35 | 4 | | 1 | 5 | 11.4 | 2.9 | 14.3 |
| | Zurmat | Darul Ulom | 99 | | | 2 | 2 | 0.0 | 2.0 | 2.0 |
| **Paktia Total** | | | **217** | **5** | | **3** | **8** | **2.3** | **1.4** | **3.7** |
| Paktika | Markaz | Khajakhel | 74 | 4 | | | 4 | 5.4 | 0.0 | 5.4 |
| | Sarhoza | Sarhoza | 109 | | | 1 | 1 | 0.0 | 0.9 | 0.9 |
| **Paktika Total** | | | **183** | **4** | | **1** | **5** | **2.2** | **0.5** | **2.7** |
| Samangan | Hazrat Sultan | Lrkhabi | 147 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Khulm | Mlkan | 150 | | | | 0 | 0.0 | 0.0 | 0.0 |
| | Sahrbagh | Langar | 149 | | | | 0 | 0.0 | 0.0 | 0.0 |
| **Samangan Total** | | | **446** | | | | **0** | **0.0** | **0.0** | **0.0** |
| Zabul | Qalat | Markaz | 150 | | | 8 | 8 | 0.0 | 5.3 | 5.3 |
| **Zabul Total** | | | **150** | | | **8** | **8** | **0.0** | **5.3** | **5.3** |
| **Grand Total** | | | **17868** | **731** | **8** | **493** | **1232** | **4.1** | **2.8** | **6.9** |

HEALTHNET INTERNATIONAL

# REPORT ON MALARIA PREVALENCE SURVEY IN AFGHANISTAN, October-November 1999

HealthNet International (HNI) has been assisting the Government of Afghanistan in its malaria control effort for the last several years. HNI began the initiative in the eastern regions of Afghanistan in the early nineties, and later in 1998 expanded its activities into the southern zone of the country. The overall objective of the program is to support and improve the control efforts against disease through local capacity and partnership building. The strategic interventions for malaria control include:

a) management of malaria problem
b) diagnosis and treatment
c) appropriate and integrated vector control
d) health education and information systems
e) community participation
f) epidemic preparedness.

In October and November 1998, HNI conducted a malaria prevalence survey during which samples from 23800 individuals were obtained from a few provinces in the north, east, and south of the country. The overall prevalence of malaria was found to be 5.2 % (*P.falciparum* 2.7 % and *P.vivax* 2.5 % respectively). There was considerable fluctuation noticed in the intensity of prevalence between different clusters of population, with one sampling cluster showing a prevalence of as high as 38.8 %.

A country-level prevalence survey was again organised by HNI in 1999 with the financial support of the European Commission and the World Health Organisation, with a view to:

- identify areas with malaria, its type and its intensity
- monitor annual trends of disease pattern
- monitor the impact of interventions
- plan for expansion of control in case of need.

**Methodology**

The survey was carried out by different partners including the MoPH, WHO, Action Contre la Faim (ACF), Afghan Health and Development Services (AHDS), Afghan Red Crescent Society (ARCS/IFRC), Coordination of Humanitarian Assistance (CHA), IBN SINA (Public Health Program for Afghanistan), Medecins Sans Frontieres (MSF-Belgium and MSF-Holland), Swedish Committee for Afghanistan (SCA) and HNI. The survey was carried out among children between 6-10 years of age, and in most cases the sampling units were the schools. In some cases, where no school existed, children from



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the communities were sampled. A sample of 150 individuals was considered adequate for each sampling unit. This target population was selected because:

i) the prevalence of the disease is likely to be higher among children, and hence better represents the local transmission as opposed to the adults who may perhaps more reflect imported disease
ii) quick and easy access to schools and children as compared to adults, particularly the female adults who are extremely difficult to access under the given conditions in Afghanistan
iii) school surveys generally allow for a wider coverage, as children in a given school may come from several localities at a reasonable distance from the school.

Training was imparted to the survey teams of the participating partners. Thick and thin blood smears were prepared from each individual in the samples, and a semi-structured questionnaire to capture the relevant demographic and other related information was administered to each. Microscopy was carried out at HNI's three reference laboratories in Jalalabad, Kandahar and Peshawar.

**Results**

Smears were taken from a total of 19169 individuals from 20 provinces from all the Regions of the country, and after preliminary analysis of the laboratory results, the complete set of data from 17868 individuals surveyed was entered in computer (Microsoft excel spreadsheet) and analyzed.

Eighty two percent of the sampled population was between 6 to 10 years of age, 10 % were below 5 years and the remainder above 10 years *(Figure 1)*. The sampling proportion appeared to be uneven *(Figure 2)*, and showed that 68.6 % of the total sample was taken from four provinces namely Nangarhar (28 %), Kandahar (15.9 %), Kunar (15.5 %), and Kabul (9.2 %).

A total of 1232 (6.9 %) cases of malaria were recorded, out of which 731 (4.1 %) were *P.falciparum*, 493 (2.8 %) were *P.vivax*, and the remaining 8 (0.04 %) were mixed infections. Table 1 shows the summary distribution of cases by different regions of the country. A province and district wise detailed list of cases is given as *Appendix 1*.

**Table 1**

| | TSE | PF(%) | PV (%) | Total malaria (%) |
|---|---|---|---|---|
| Central | 1752 | 0.5 | 0.4 | 0.9 |
| East | 9415 | 6.4 | 4 | 10.5 |
| North | 2067 | 3.8 | 1.5 | 5.3 |
| South | 4058 | 0.8 | 1.5 | 2.4 |
| West | 576 | 2.3 | 0.5 | 2.8 |
| Total | 17868 | 4.1 | 2.8 | 6.9 |

The data showed considerable variation in malaria levels between and within provinces as well as districts. The most heavily burdened provinces for malaria were Baghlan (17.3 %), Faryab (14.9 %), Kunar (10.4 %), Laghman (11.1 %), Nangarhar (11.3 %), and Khost (8.8 %) provinces *(Appendix 1).*

The geographic distribution of *P.falciparum* and *P.vivax* in different parts of the country is shown in *Figures 3 & 4* respectively. The age distribution of malaria is shown in *Figure 5,* and the age adjusted distribution of both falciparum and vivax malaria is given in *Figure 6*. The figure shows a higher proportion of falciparum cases among all age groups, which is expected to be the case during the October/November period. The proportion of females in the sample was 33.3 %, and the prevalence of malaria in this group was 7.9 %, higher as compared with males (6.4 %), and this gender difference was significant (MH age adjusted odds ratio 1.24, 95 % ci 1.1-1.41). *(Figure 7).*

An attempt was made in the survey to relate clinical signs with malaria, but due to lack of clinical abilities of the surveyor personnel as well as shortage of time, the information yield was limited. However, of those who had fever, 12.5 % were confirmed as having malaria. In addition, 6.4 % with no history of fever also had malaria *(Table 2)*. This indicates that a substantial proportion of the affected cases do not exhibit symptoms and may therefore escape the passive case reporting of disease of the primary health care systems.

**Table 2**

| Fever | *P.falciparum* | *P.vivax* | Mixed | Total Cases | Total Examined |
|---|---|---|---|---|---|
| No | 619 (3.8) | 420 (2.6) | 7 (0.04) | 1046 (6.4) | 16379 |
| Yes | 112 (7.5) | 73 (4.9) | 1(0.07) | 186 (12.5) | 1489 |
| | 739 (4.1) | 493 (2.8) | 8 ((0.04) | 1232 (6.9) | 17868 |

(Percentage given in parenthesis)

The survey also captured information regarding the use of bed nets. A total of 10687 (59.8 %) individuals responded to the question regarding bed net use, and the analysis on bed net usage has been restricted to this sample. Of these 2251 (21.1 %) claimed to be using bed nets and the usage varied considerably from province to province (*Figure 8).* The over all malaria among bed net user was 4.9 %. Among the non-bed net users a marginally high rate of 5.2 % was noted. Stratifying for species, the prevalence of falciparum malaria was 3.2 % and 2.5 % among the bed net users and non-users respectively. Similarly, the prevalence of vivax malaria was 2.5 % and 2.4 % among the bed net users and non-users respectively *(Figure 9).* The relationship of falciparum and vivax malaria with bed net usage is shown as scatter plots in *Figures 10 & 11*. Although, not reaching levels of statistical significance, there nonetheless seemed to be a trend, indicative of protection from malaria with bed net usage. A correlation of 0.4 was observed in the decline of falciparum malaria in relation to increasing bed net use. With

vivax malaria, a much lower correlation (0.18) was observed. The survey data indicate that bed net usage is perhaps giving some protection against falciparum malaria, as opposed to none in the case of vivax malaria, where no such effect was observed.

The data was further grouped regionwise into a) East (Khost, Kunar, Laghman, and Nangarhar provinces), b) South (Kandahar and Helmand provinces), and c) other regions. The overall malaria prevalence among the non-users was consistently higher among the non-bed net users as compared with those who use bed nets *(Figure 12).* As observed earlier, this protective effect was more pronounced with falciparum malaria *(Figure 13).*

**Conclusions**

The survey showed both species of malaria i.e, *P.vivax* and *P.falciparum* to be present in many areas of the country, the latter being predominant. Prevalence rates of *P.falciparum* generally are increased during this time of the year and this was illustrated by the survey.

The survey showed that overall the malaria prevalence in the country has risen during 1999 as compared with the previous year. This increase has mainly affected the eastern and northern regions of the country. In other areas the disease has remained at low levels and even shown a decline. The reasons for this increase could be attributed to several factors such as climatic changes, parasite resistance, lack of health education with regard to disease prevention among the population, lack of adequate control measures and overall poor socio-economic conditions in the country. The data further demonstrated a great degree of variation of prevalence rates between and within provinces, districts and villages.

The survey was carried out mainly in children, and although the proportion of female children sampled was lower (almost one third of the total sample) as compared with males, the prevalence rates for malaria in the former appeared higher. Although the survey design limited its ability to capture the prevalence among the adults, there is reason to believe that the same picture may be true for all age groups. Analysis of clinical data from primary health care centers in the eastern Afghanistan region shows no gender differences. This suggests the possibility that the proportion of sick females reporting to clinic for seeking malaria treatment may be lower than males. This however, needs further investigation, and if found to be true, more efforts will be needed to address the issue of malaria among the female population in the country.

A significant proportion of cases with active disease was found to be afebrile, and in fact asymptomatic. This finding could have resulted from the inherent weakness of the instrument used, and from the clinical skills of survey personnel. Although measurements of fever were not taken at the time of the survey, and information regarding fever was based upon the surveyor's clinical judgment and the individuals' perception, the overall proportion of confirmed malaria among those with fever was 12.5 %. This figure is

confounded by the limited sensitivity of the tool used, and in areas with high prevalence the association with clinical fever and malaria is likely to be higher. Nevertheless, the data is also suggestive that a substantial proportion of patients with clinical fever may have diseases other than malaria. An earlier report from Nangarhar suggests that around 30-40 % of all cases reporting to the clinics during the autumn months is due to malaria. This figure may rises to 60-65 % in high malaria endemic areas and in case of epidemics.

Overall, the impact of bed net usage on disease appeared to be marginal, however a more pronounced effect was noted in the case of protection from *P.falciparum* as compared with *P.vivax*. The survey instrument did not allow for an in-depth analysis of the impact of insecticide treated bed nets specifically. It can however be argued that the response especially from the eastern region reflected the use of insecticide treated bed nets as this has been an area for intense bed net implementation activities for several years. The survey showed more or less a similar pattern of disease among the users and non-users of bed nets as observed else where in the country. Although the survey design was not robust enough to capture the impact of (insecticide treated) bed nets, it does however, provide a snap shot view and some clues as to their effectiveness. Furthermore, it supports the work already carried out in this regard.

The survey shows a high bed net use in certain areas such as Balkh, Herat and Baghlan. These are apparently areas where active malaria control is not in place as it is for example in Eastern and Southern Afghanistan. This is suggestive of private sector sale and distribution of untreated bed nets. There appears to be a market for bed nets especially in the urban areas, which in all likelihood is supported through import of bed nets from countries like Iran and elsewhere. Nevertheless, in spite of the limited sampling in these regions, data suggest the positive impact of bed net usage in these regions. Further verification and follow up of this information would be of great interest.

**Limitations of the survey**

- The sampling was mainly carried out in children, so information about disease prevalence is limited to this age group. The survey provides limited information about the disease prevalence in other age groups.
- There was a sampling disproportion among different regions of the country. This resulted mainly because of increased resources available in these parts, because of large-scale malaria interventions being implemented. The information yielded thus has to be interpreted in the context of this specific constraint.
- The survey instrument needs to be further improved and standardized, in order to render it robust enough to capture more useful data.
- Monitoring and supervision of the survey staff was not effected during the conduct of the survey. The survey methodology and conduct can therefore be substantially improved through standardization of the survey tool, training, monitoring and supervision of the survey personnel as well as increased coordination between different partners in the planning and implementation of the exercise.

In conclusion therefore the information provided by the survey is quite useful in:

a) providing information regarding the disease trends
b) identifying areas with high prevalence
c) demonstrating a high prevalence in the female children
d) providing a basis for needs-based implementation for control measures
e) demonstrating that the tool can be used for impact evaluation
f) providing information regarding the bed net use in different parts of the country
g) realizing the need for improvement in the survey methodology to obtain further quality information.

**FIGURE 1**
**MALARIA PREVALENCE SURVEY IN AFGHANISTAN. OCT/NOV 1999**
***Age distrbution of population sampled ( Total sample 17868)***

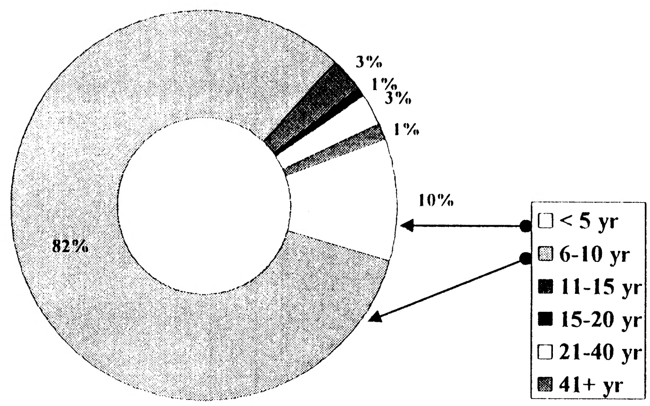
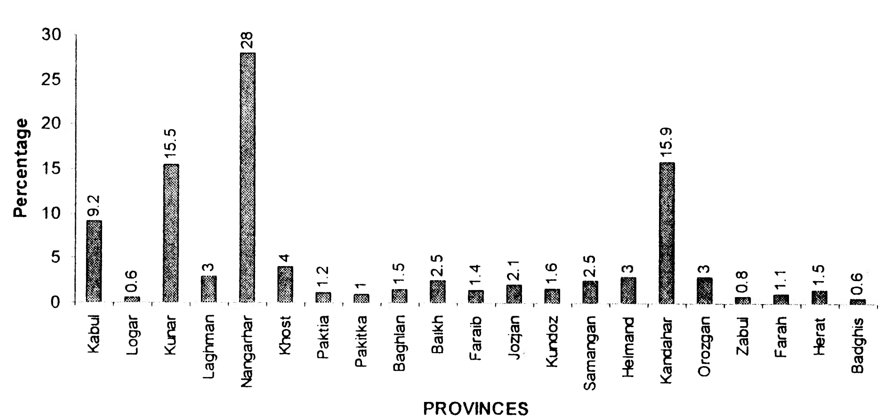



*FIGURE 2*

MALARIA PREVALENCE SURVEY IN AFGHANISTAN OCT/NOV 1999

*Province wise distribution of the population sampled. (Total sample 17878)*



# FIGURE 3

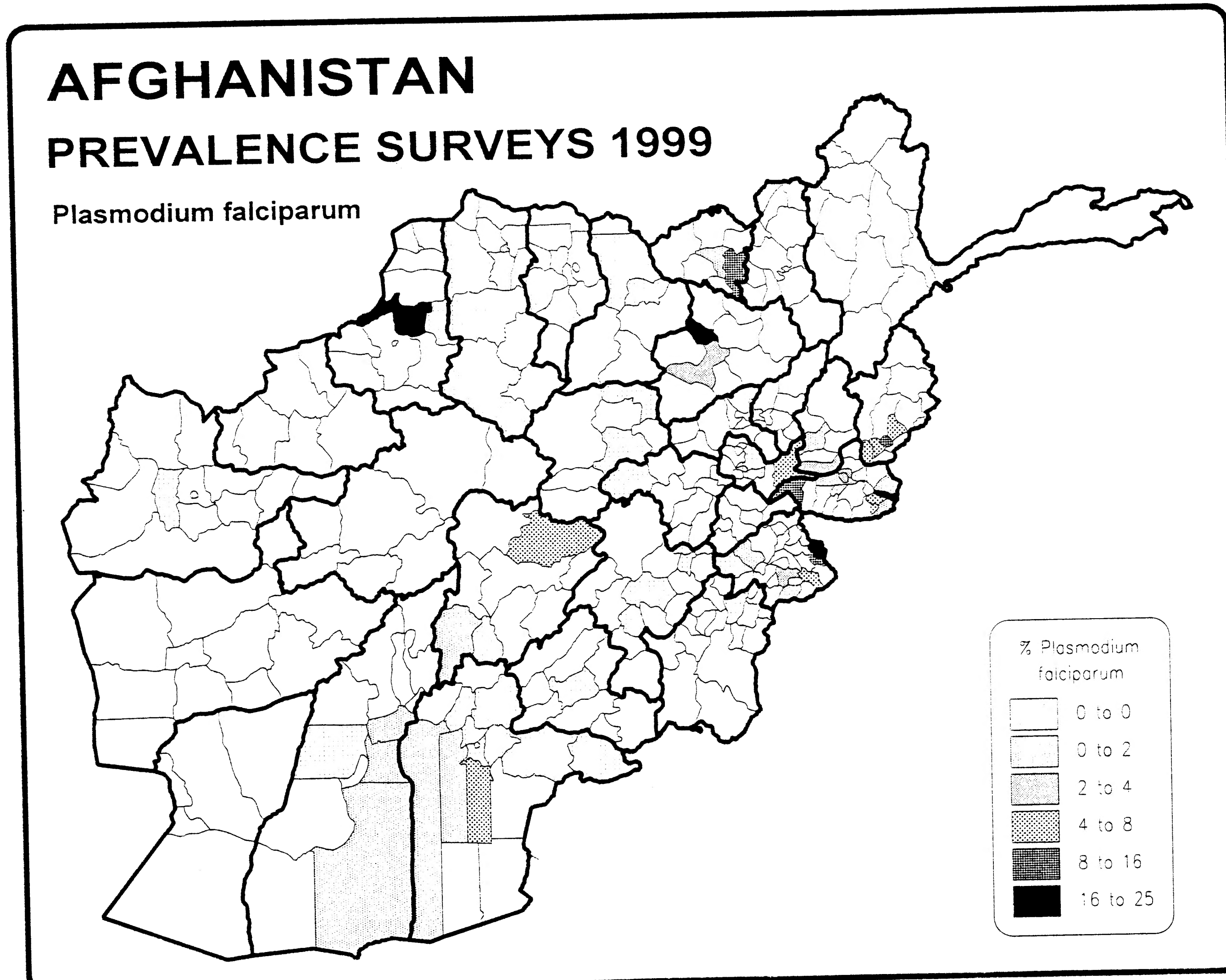
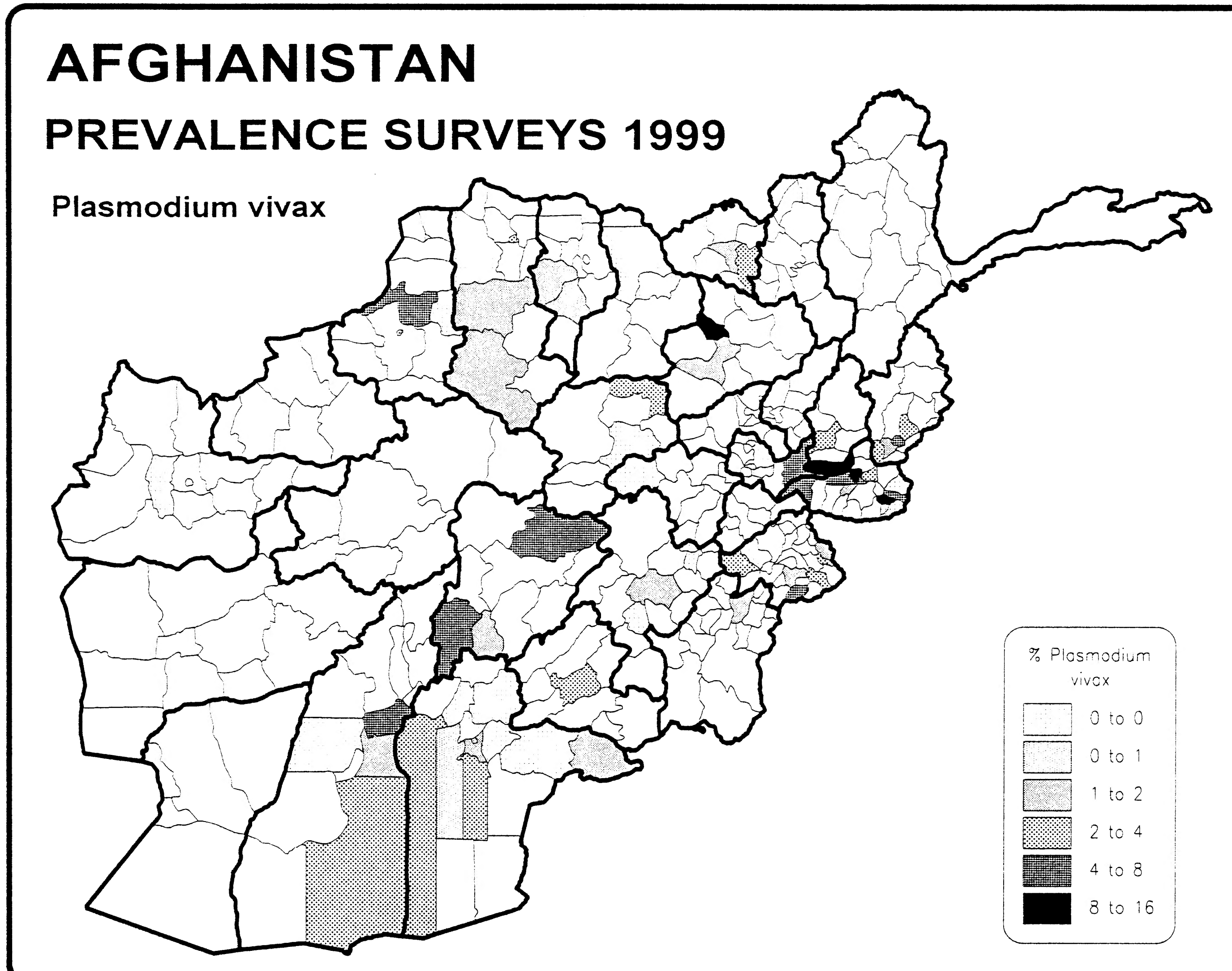

AFGHANISTAN
PREVALENCE SURVEYS 1999
Plasmodium falciparum
% Plasmodium falciparum
0 to 0
0 to 2
2 to 4
4 to 8
8 to 16
16 to 25

*FIGURE 4*


AFGHANISTAN
PREVALENCE SURVEYS 1999
Plasmodium vivax
% Plasmodium vivax
0 to 0
0 to 1
1 to 2
2 to 4
4 to 8
8 to 16

HEALTHNET
INTERNATIONAL

# MALARIA PREVALENCE SURVEY

## AFGHANISTAN

## October - November 1999

Conducted with financial support
from the European Commission and the World Health Organisation

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